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‘Bottlenecks, showstoppers and train-wrecks’ – impediments to achieving integrated marine management across national and international borders

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Abstract

Several initiatives have been taken worldwide to promote international coordination and integrated approach in marine management. At the European level, ten years after the adoption of the Marine Strategy Framework Directive (MSFD), the Member State strategies still present some ecological, economic and social challenges. This review identifies the minor, intermediate and major impediments (respectively defined as ‘bottlenecks, showstoppers and train-wrecks’) to marine management, resulting from a 4-year analysis of national, regional and European reports. Most of the problems are linked to the resistance of countries to collaborate and to the inability to integrate the work already carried out under other pieces of legislation. The European countries will need to better integrate and coordinate their actions in marine management in the second cycle of the MSFD, in order to achieve its final goal of Good Environmental Status as well as the objectives of other environmental policies.

Keywords: International Cooperation; Regional Coherence; Integrated Management; Marine Strategy Framework Directive

1. Introduction

Marine ecosystems worldwide, their services and the societal goods and benefits they provide play a central role in the Blue Growth strategy (Burgess et al., 2018; Eikeset et al., 2018). They are however threatened by multiple pressures and little is known about the cumulative effects of maritime activities (Elliott, 2014; EEA, 2015; Halpern et al., 2008; Elliott et al., 2018; Holon et al., 2018; Cormier et al., 2019). European countries recognised the need to move towards an integrated management and assessment approach, adopting the Integrated

Maritime Policy[1]. This policy aims to increase coherence among marine sectors by implementing the Maritime Spatial Planning Directive (MSPD) (European Union, 2014), which is the 'Blue Growth directive', and to promote a sustainable use of marine resources through the Marine Strategy Framework Directive (MSFD) (EC, 2008; Borja et al., 2017), which can be considered the 'environmental directive'.

The European MSFD is considered one of the most ambitious instruments of marine governance worldwide (Borja et al., 2017), and it has the central aim to achieve or maintain Good Environmental Status (GES) of the European regional seas by 2020, at the latest, based on 11 qualitative descriptors: D1 Biodiversity; D2 Non-indigenous species; D3 Commercial fish and shellfish; D4 Food webs; D5 Eutrophication; D6 Seafloor integrity; D7 Hydrographic conditions; D8 Environmental contaminants; D9 Contaminants in seafood; D10 Marine litter and D11 Introduction of energy, including noise. This requires Member States 1) to carry out an initial assessment of marine status; 2) to define GES for their waters in coordination with neighbouring countries of the same region; 3) to establish monitoring strategies; and 4) to implement management responses (termed 'programmes of measures') to achieve the aims (Figure 1). The MSFD is part of a large body of European and national marine legislation and international agreements (Boyes and Elliott 2014; Cormier et al., 2018) which all have to be implemented to ensure complementarity among objectives and avoid overlaps. It is of note that the MSFD is being implemented through the Regional Seas Conventions such as OSPAR (for the North East Atlantic), HELCOM (for the Baltic Sea), Barcelona (for the Mediterranean) and Bucharest (for the Black Sea) (Article 6, MSFD). This in itself requires and creates a source of harmonisation across adjacent states.

In 2018, the Directive is entering its second cycle where countries are required to achieve coherent, coordinated and consistent updates of the determinations of GES, Initial Assessments and Environmental Targets (EC, 2014a). At this stage of the implementation, it is especially important to understand what were the major impediments identified in studies carried out at national, regional and European level and to propose recommendations to support all the parties involved in the future phases of implementation of this Directive in overcoming these impediments. The present work puts together these impediments, or challenges, categorising them into 'bottlenecks', the aspects which can be cleared easily; 'showstoppers', the aspects that require rather more effort, and 'train-wrecks', the aspects which are especially difficult to solve and yet will prevent the outcomes being reached

[1] https://ec.europa.eu/maritimeaffairs/policy_en

(modified from Newton & Elliott, 2016). More specifically, the focus here is on discussing the challenges related to transboundary cooperation and policy integration, and providing some recommendations on the basis of the results of a 4-year study. The latter focused on an in-depth analysis of national, European Commission and Regional Seas Conventions reports and a dedicated survey (Cavallo et al., 2016; 2017; 2018). These recommendations can also be considered in the implementation of other European and international environmental legislation based on similar principles.

----------Figure 1 here ----------

2. Present and future challenges

In recent decades, new legislation and agreements have been adopted by coastal countries to move toward a cooperative and coordinated management of marine resources to address transboundary issues such as migratory species, fisheries, marine pollution and climate change (Table 1).

----------Table 1 here ----------

At the European level, the MSFD has been widely investigated in most of its aspects to identify the challenges that Member States have faced to meet its ambitious goals (e.g. Berg et al., 2015). These challenges have been categorised here according to their level of severity (Table 2) and the aspects related to countries cooperation and policy integration are discussed more in detail in the following seven points.

----------Table 2 here----------

2.1 Consistency in reporting

A comparative analysis of national strategies indicated that the reporting format was not consistent across countries (Cavallo et al., 2018), despite the many recommendations provided by the European Commission (EC, 2014b; 2017) and the Regional Seas Conventions (i.e. OSPAR, 2012, 2015). For example, the Commission Decision 2010 (amended by EC, 2017) provides a list of criteria and methodological standards for each descriptor to be used by the Member States to assess the extent to which GES is being achieved. The differences in reporting make it difficult to identify best practices and situations where countries build in their strength, and so further scientific research and implementation

mechanisms are needed to fill in knowledge gaps. A more extensive use of existing guidelines and recommendations will help countries to produce more readily comparable reports, learning from each other and to align GES definitions, environmental targets and management measures.

2.2 Applying the subsidiarity principle

In common with the link between federal and state legislation in the US, EU legislation centres on the subsidiarity principle that decisions should be taken as close to the people (the local level) as possible and indeed this is reflected in the term 'Framework' in the title of MSFD and other major directives, i.e. a bottom-up approach. Hence the overall aim is to achieve the same outcome across Member States (in the case of the MSFD to obtain GES in their waters) while leaving the detailed method of implementation to the discretion of the Member State. This therefore automatically creates the potential, albeit sanctioned by the EU, for different ways of implementing the MSFD and so leads to inconsistencies between Member States.

The many differences in the way countries implemented the phases of the Directive for each descriptor (see EC, Annex 2014; 2018; Cavallo et al., 2016), made it impossible always to achieve a high level of coherence across each region, namely in the targets, the indicators and the criteria to assess the status, and the management measures. When the factors leading to these differences are strictly related to specific national geopolitical, social, and biogeographical characteristics (such as biodiversity composition and types of anthropogenic pressures) and on the financial resources available, countries should not be forced to adopt a common approach. However, according to the European Commission (EC, 2017), in such cases "Member States shall provide the Commission with a justification in the framework of the notification made pursuant to Article 17(3) of the Directive".

2.3 Harmonisation does not mean uniformity

It is possible, necessary and indeed urgent to work together to establish common targets and GES definitions, ensuring that each country is contributing to improve the environmental quality of the whole marine region. This is also needed in an attempt to ensure that there is not a disjointed assessment down the mid-lines in the sea areas between adjacent Member States. This is required for understanding existing trade-offs between conflicting stakeholder objectives and ecosystem services, in order to achieve regional win-win management strategies, i.e. to protect the natural system and deliver the societal benefits (Elliott, 2011).

The European Commission Decision (EC, 2017) and Directive (EU) 2017/845 (amending the Directive 2008/56/EC), review the existing guidelines, taking into consideration recent scientific and technical progress. In particular, the first of these documents provides an updated list of criteria and methodological standards for the definition of GES, while the latter amends Annex III of the Directive with an updated list of ecosystem elements, anthropogenic pressures and human activities. These new indications, if adopted, can improve regional and European coherence in the future phases of the implementation of the Directive.

2.4 Adopting a common list of threatened species and core indicators

In the analysis of the first cycle of the Directive, the lowest levels of regional coherence were found for Biodiversity related descriptors (EC, Annex 2014). Moreover, although the need to adopt a common list of the most threatened species/habitats whose distribution spans international borders is widely recognised in international agreements such as the Bonn Convention[2] and the IUCN[3], a general lack of consideration of the existing lists was noticed (Cavallo et al., 2016; 2018). Adopting such a list should be a priority among Member State national strategies, not only in the context of the MSFD. In particular, the OSPAR Commission list[4] including invertebrates, fish, birds, reptiles and mammals, offers a valid reference of vulnerable species and habitats that are specific for the five OSPAR regions.

Each of the Regional Seas Conventions has developed or is developing its own list of core indicators in line, where possible, with those of the MSFD (i.e. OSPAR Biodiversity Common Indicators[5] and the HELCOM core indicators[6]) and indeed there are some generic aspects here. For example, each list has the breeding success of a dominant piscivorous seabird (the kittiwake in the NE Atlantic and the White-tailed Sea Eagle in the Baltic). However, the desire by each area, Member State or region or group of scientists to create their own indicators has resulted in a very large number (>600) of indicators (Teixeira et al., 2016). It would be of value to create a core list of generic indicators to use in all regional seas but again adopting this would imply greater top-down control.

The confusion between indicators has increased further with the move by countries in their attempts to achieving the UN Sustainable Development Goals, for example SDG14 covering

[2] Also called the Convention on the Conservation of Migratory Species of Wild Animals
[3] The International Union for Conservation of Nature Red List of Threatened Species
[4] https://www.ospar.org/work-areas/bdc/species-habitats/list-of-threatened-declining-species-habitats
[5] https://www.ospar.org/work-areas/bdc/biodiversity-monitoring-assessment-1/biodiversity-common-indicators
[6] http://www.helcom.fi/baltic-sea-trends/indicators/core-indicators

159 marine waters (Cormier and Elliott, 2017). The MSFD is being proposed as the means in
160 Europe of meeting SDG14 and hence a subset of indicators has been adopted[7]. However,
161 these indicators differ from those adopted by the UN for the SDG as a whole[8] thus giving the
162 potential for yet more confusion. There is the potential that countries will be so confused
163 regarding which indicators to follow that they do not achieve any of them.

164 *2.5 Ensuring integration among environmental legislation*

165 Although the MSFD intends to integrate, not to replace, related environmental legislation
166 (Boyes and Elliott, 2014), in national reports many differences were found in the way
167 countries integrated the objectives, measures and, in general, the work already carried out in
168 those contexts. For D3-Commercial fish and shellfish, different ICES (International Council
169 for the Exploration of the Sea) reference points have been used across the North-East Atlantic
170 region for the initial assessment, e.g. F (fishing mortality), F_{MSY} (Fishing mortality consistent
171 with achieving Maximum Sustainable Yield), etc. Despite this, the representatives of the EU
172 Marine Strategy Coordination Group recognised, when questioned in a dedicated survey, the
173 importance of coherent policy integration for the success of the MSFD (Cavallo et al., 2017).
174 A stronger collaboration among all the parties from the early stages of the development of
175 national strategies will help Member States disentangle the web of European, regional and
176 international environmental legislative instruments, and to identify the issues where they
177 overlap and where new legislative instruments are necessary.

178 *2.6 Reducing uncertainty among economic sectors*

179 Coordinating actions at regional and sub-regional levels is essential to regulate socio-
180 economic activities that impact waters beyond national borders, such as shipping, fisheries
181 and offshore renewable energy sectors, and thus influence achieving GES of the whole region
182 (Elliott et al, 2018). It is suggested that more coherent GES definitions (see Borja et al., 2013)
183 and management measures across regions will reduce uncertainty among those economic
184 sectors whose activities span geopolitical boundaries. Moreover, a more transparent
185 stakeholder engagement process should be set both at European and at regional level to give
186 all the parties affected by this Directive the opportunities to share their views and concerns
187 (see Ounanian et al., 2012; De Santos, 2011; 2016).

[7] https://ec.europa.eu/eurostat/web/sdi/life-below-water
[8] https://unstats.un.org/sdgs/indicators/indicators-list/

188 It is emphasised that the MSFD is only one pillar of the EU Maritime Strategy and that it now
189 has to be jointly implemented with a newer instrument, the MSPD (European Union, 2014).
190 This aims to ensure that the spatial allocation of marine activities, and thus the ability to
191 achieve Blue Growth and protect the Blue Economy, is harmonised with the need to protect
192 the health of the seas (Elliott, et al., 2018). The joint implementation of these two Directives,
193 the MSFD and MSPD, will be a major challenge in the coming years.

194 *2.7 Cooperation in the economic analysis*

195 The review of the Cost-Benefit analysis in the Initial Assessment (EC, Annex 2014) and the
196 Programmes of Measures (Cavallo et al., 2018; EC, 2018 Annex) revealed data gaps for most
197 European Member States. For example, Portugal admits in its report that there is poor current
198 scientific knowledge about the deep sea ecosystems that makes it difficult to assess the
199 economic value of the different ecosystem services and their societal goods and benefits, and
200 their trade-off, which can be influenced by the establishment of oceanic MPA (Cavallo et al.,
201 2018). There is a need to increase the level, amount and accuracy of the information on non-
202 market benefits of coastal and marine ecosystems when addressing the efficiency of
203 management decisions thereby understanding the multiple ecosystem services and the societal
204 benefits that they provide for multiple sectors (Turner and Schaafsma, 2015; Torres and
205 Hanley 2016; Mehvar et al. 2018). In this approach, Norton and Hynes (2018) account for use
206 and non-use value derived from achieving the GES in the North-East Atlantic, estimated to
207 vary between €2.3 billion and €3.6 billion per annum. However, accounting explicitly for the
208 cultural ecosystem services, which are not readily amenable to being measured either by
209 biophysical or monetary metrics, remains a necessary key challenge (Diaz et al. 2018; Fish et
210 al. 2016; Bryce et al., 2016).

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212

213 **3. Discussion**

214 Ten years from its adoption, some progress has been made to move towards a more
215 coordinated and harmonised implementation of the MSFD but several ecological, economic,
216 social and governance challenges remain. Some of the bottlenecks and showstoppers have
217 been analysed and recommendations are given for overcoming these in the future. The present
218 section focuses on the train-wrecks which are the aspects especially difficult to solve and are
219 related to the challenges discussed in Section 2.

In general, in the first cycle of the implementation of the MSFD (2012-2018) a national approach has prevailed, suggesting a certain resistance by Member States to cooperate. However, some of the problems discussed here may be the result of the lack of economic resources, lack of experts with multidisciplinary background and the short-time scale of the Directive (Table 2). In fact, to fulfil the objectives of this ambitious Directive, countries are required to make significant financial investment, especially in carrying monitoring programmes (Borja and Elliott, 2013; Zampoukas et al., 2013; Shephard et al., 2015; Nygard et al., 2016), to fill the gaps in ecological and socio-economic data and to implement their programmes of measures. It has been shown here that other problems are related to the complexity of reporting and the integration of the work from several environmental policies.

In this review, more emphasis has been given to the lack of transboundary cooperation since this is a major requirement of the MSFD and of other international marine legislation (see Table 1). However, from a 4-year comparative analysis of national reports (Cavallo et al., 2018) other forms of collaboration and cooperation have emerged as equally important to meeting the targets of the MSFD and to overcome some of the problems identified here. For example, better collaboration between countries and scientific communities is essential to fill gaps in data and knowledge. To this end, ad-hoc platforms have been developed, such as the WISE-Marine[9] for sharing information on the state of the marine environment or the Working Group on Programmes of Measures and Socio-Economic Analysis to develop common approaches to carry out the economic and social analysis. Moreover, two subgroups focusing on emerging issues of particular concern, such as underwater noise[10] and litter[11], have been set up to provide a forum for exchange of principles and best practice on assessment methodologies.

To date, cooperation among all the parties involved in the implementation of the MSFD have been supported by specific multi-stakeholders platforms established at sub-regional, regional and European levels and other existing one (i.e. the Regional Seas Conventions). While these have been widely accepted (Cavallo et al., 2017) they have not been used to their full potential.

These types of structures have been demonstrated to be effective instruments not only to fill knowledge gaps but also to identify and resolve conflicts, to overcome a lack of

[9] http://marine.copernicus.eu/usecases/wise-marine-platform-support-msfd/
[10] https://www.iqoe.org/library/8061
[11] http://mcc.jrc.ec.europa.eu/dev.py?N=41&O=434&titre_chap=TG%20Marine%20Litter

communication and resistance to collaborate and to foster trust and the adoption of common solutions (Jones et al., 2013; Pinkerton, 1989; Berkes, 2007; Granovetter 1973). However, given that the MSFD is a Framework Directive, responsibility for implementation lies with the willingness of each Member State and its commitment should be achieved through voluntary agreements, reached by consensus amongst the relevant stakeholders (Beunen et al., 2009). Ultimately, the successful regional implementation of the Directive relies on the will of individual national governments. This is in accordance with the principles of subsidiarity (Art. 5 of the Lisbon Treaty[12]) that "seek to safeguard the ability of the Member States to take decisions and action and authorises intervention by the Union when the objectives of an action cannot be sufficiently achieved by the Member States, but can be better achieved at Union level". When implementing the MSFD "Member States are required to cooperate to ensure the coordinated development of marine strategies for each marine region or subregion" (Paragraph 13 of the MSFD) suggesting that countries adopt a wider spatial scale of implementation that goes beyond national borders. While the subsidiarity principle is acceptable/accepted and tolerable for terrestrial and freshwater legislation, in which the implementation is confined to a Member State territory, this may be considered an impediment for marine waters. This can be regarded as a *Paradox of Subsidiarity* (see Cavallo et al., 2016). In fact, marine waters are intimately linked with adjacent waters and indeed have some features such as fish stocks, the diversity of mobile species, and the delivery of contaminants, which cannot be separated from adjacent waters and even those further away. Hence, it is argued here that when agreement in transboundary issues cannot be achieved on voluntary bases and the actions, or inactions, of a country could compromise the GES of the entire region, a greater top-down control may be necessary. This possibility is contemplated in Paragraph 43 of the Directive which states that "Since the objectives of this Directive, namely protection and preservation of the marine environment, the prevention of its deterioration and where practicable the restoration of that environment in areas where it has been adversely affected, cannot be sufficiently achieved by Member States and can therefore, by reason of the scale and effects of the Directive, be better achieved at Community level, the Community may adopt measures, in accordance with the principle of subsidiarity as set out in Article 5 of the Treaty". Moreover, Articles 2-6 of the Treaty on the Functioning of the European Union specify the areas of EU competence, which include an exclusive competence for the conservation of marine biological resources under the CFP, and shared competence for

[12] www.lisbon-treaty.org/wcm/the-lisbon-treaty/treaty-on-european-union-and-comments/title-1-common-provisions/9-article-5.html

environment, transport, energy and economic, social and territorial cohesion (see Qiu and Jones, 2013).

This anomaly is compounded further by the fact that the EU aims for the MSFD to be implemented through the Regional Seas Commissions, which are international agreements by treaty and in which there is no legally-binding sanctions. Any disputes between signatories to the Regional Seas Conventions are handled through bilateral arbitration[13]. This is in contrast to EU law in which failures to implement legislation ultimately results in infraction proceedings under the auspices of the European Court of Justice (Bell et al., 2017).

4. Conclusions

As the 2020 deadline for GES is approaching, it has become urgent to identify the main problems hampering the achievement of the final aim of this ambitious directive and a greater effort is required by all the parties involved in its implementation to overcome them. The current work contributes to synthesising and categorising these problems and a number of recommendations are proposed to achieve better coordination among countries and stakeholders. These include a more extensive use of existing multi-sectoral platforms and with more willingness to move from a national to a regional scale of implementation adopting the ecosystem-based approach as the bases of the MSFD and other international agreements.

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[13] http://ec.europa.eu/environment/marine/international-cooperation/regional-sea-conventions/ospar/index_en.htm

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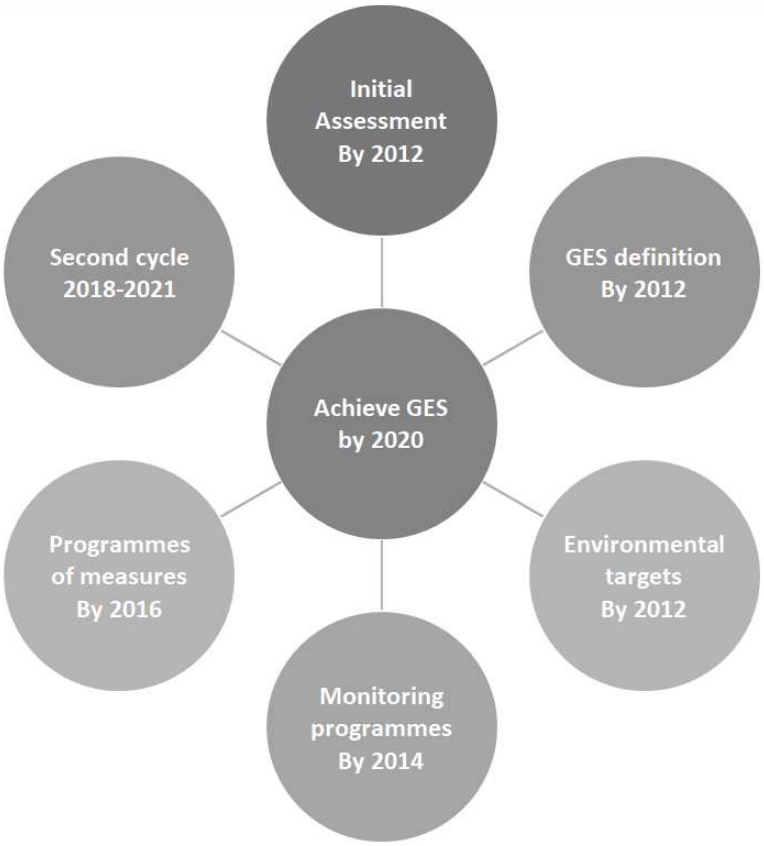

Figure 1. Cyclical timeline of the Marine Strategy Framework Directive repeated every six years. GES: Good Environmental Status.

469 **Table 1**
470 Global examples of international coordination and integrated marine management. IOC:
471 Intergovernmental Oceanographic Commission; UNESCO: United Nations Educational, Scientific and
472 Cultural Organization; CoP: Conference of the Parties; UNEP: United Nations Environmental
473 Program.

Legislation	Geographic area	Description
Caribbean Challenge Initiative[14]	Bahamas, British Virgin Islands, Dominican Republic, Grenada, Jamaica, Puerto Rico, St. Lucia, St. Kitts & Nevis, St. Vincent & the Grenadines	Brings together leaders of Caribbean governments and business leaders to take collaborative action to protect and sustainably manage their marine environment.
Integrated Marine and Coastal Regionalisation of Australia[15]	Australia	A spatial framework for classifying Australia's marine environment into bioregions, at a scale useful for regional planning.
Integrated Maritime Policy (2007)	28 European Member States	Seeks to provide a more coherent approach to maritime issues, with increased coordination between different policy areas.
Intergovernmental Oceanographic Commission (IOC – UNESCO)	Global scale	The Commission assists countries in implementing the Marine Spatial Planning with an ecosystem-based approach since 2006 (UNESCO, 2017)
Oceans Act of 2000[16]	USA	Establishes a commission to make recommendations for coordinated and comprehensive national ocean policy
Sustainable Development Strategy for Seas of East Asia[17] (2003)	Brunei Darussalam; Cambodia; China; DPR Korea; Indonesia; Japan; Malaysia; Philippines; RO Korea; Singapore; Thailand; Vietnam; Lao PDR and Timor-Leste	Incorporates relevant international conventions, existing regional and international action programmes for achieving sustainable development of the Seas of East Asia.
UN Convention on Biological Diversity[18] (Decision II/10, CoP in Jakarta in November 1995)	Global scale	Support the adoption of the Integrated Marine and Coastal Area Management (IMCAM) to prevent and mitigate adverse impacts from human activities in the marine environment and to contribute to the restoration of degraded coastal areas
UNEP Regional Seas Conventions[19]	143 countries are included in 18 Regional Seas Conventions and Action Plans	Legally binding Conventions to tackle common environmental issues through joint coordinated activities.
UNEP Global Programme of Action[20] (1995)	More than 108 governments	It is the only global initiative directly addressing the connectivity between terrestrial, freshwater, coastal and marine ecosystems. It aims to protect and preserve the marine environment from the impacts of land-based activities, through the Washington Declaration.

[14] http://caribbeanchallengeinitiative.org/
[15] www.environment.gov.au/node/18075
[16] https://www.congress.gov/106/plaws/publ256/PLAW-106publ256.pdf
[17] http://www.pemsea.org/our-work/regional-marine-strategy
[18] https://www.cbd.int/marine/imcam.shtml
[19] http://drustage.unep.org/regionalseas/who-we-are/overview
[20] http://web.unep.org/nairobiconvention/unep-global-programme-action-unepgpa

474 Table 2 Examples of 'Bottlenecks', 'Showstoppers' and 'Train-wrecks' in marine
475 management (modified from Newton and Elliott 2016).

Bottlenecks*	**Showstoppers***	**Train-wrecks**
– Insufficient monitoring budget – Lack of (shared) targets [2.3, 2.4] – Decision on indicator aggregating methods – Multiple stakeholder fora [2.6] – Lack of data (ecological, social and economic) [2.1, 2.4, 2.6, 2.7] – Excessive and redundant advice documents [2.1] – Lack of harmonised and generic indicators [2.2, 2.4, 2.7]	– Complex regulation [2.4, 2.5] – Complex reporting [2.1, 2.4] – Lack of experts with multidisciplinary background – Overlapping designation – Sectoral management (e.g. separate management for fisheries, energy, nature conservation) [2.5, 2.6] – Poor coordination among national agencies – Different economic prerogative (i.e. Blue Growth with precedence over GES) [2.2, 2.6] – Lack of use of technologies – Short time-scale	– Resistance to collaborate – Lack of dedicated funding – Legal challenges – Political will – Unwillingness to adopt joint aims/vision – Inflexible planning system – Socio-cultural conflicts

476 *The numbers in brackets in column 1 and 2 refer to the sections in the main text where challenges
477 related to transboundary cooperation and policy integration are discussed. Illustrations of train-wrecks
478 are evaluated in the Discussion section.